

**In the claims:**

Please **cancel** original claims 1-50.

Please **add** the following claims:

51. (New): A substrate processing apparatus comprising:

- a processing vessel for processing a substrate therein, the substrate having a deposit on a surface thereof;
- a substrate holding member for holding the substrate in the processing vessel;
- a process gas supply section for supplying a process gas into the processing vessel;
- a solvent vapor supply section for supplying a solvent vapor into the processing vessel, the solvent vapor supply section having a solvent heater for generating and heating the solvent vapor;
- a main heater for heating the processing vessel;
- a control unit for controlling the solvent heater and the main heater to control a temperature of the substrate and a temperature of the solvent vapor such that a mixed gas molecular layer of a mixture of gas molecules of the solvent and molecules of the process gas is formed on the substrate to alter the deposit of the substrate into a water-soluble substance.

52. (New): The substrate processing apparatus according to claim 51, further comprising:

- a gas flow controller for controlling a supply rate of the process gas into the processing vessel; and
- a vapor flow controller for controlling a supply rate of the solvent vapor into the processing vessel.

53. (New): The substrate processing apparatus according to claim 52, wherein the gas flow controller and the vapor flow controller are controlled by the control unit.

54. (New): The substrate processing apparatus according to claim 52, further comprising a discharge flow controller for controlling a discharge rate from the processing vessel to maintain a pressurized atmosphere in the processing vessel.

55. (New): The substrate processing apparatus according to claim 51, further comprising a purge gas supply section for supplying a purge gas into the processing vessel to purge the processing vessel of the remaining process gas and solvent vapor.

56. (New): The substrate processing apparatus according to claim 51, further comprising a hot gas supply section for supplying a hot gas into the processing vessel to heat an atmosphere in the processing vessel.

57. (New): The substrate processing apparatus according to claim 51, wherein the process gas is an ozone gas and the solvent vapor is a water vapor.

58. (New): The substrate processing apparatus according to claim 57, further comprising:

a gas flow controller for controlling a supply rate of the ozone gas into the processing vessel; and

a vapor flow controller for controlling a supply rate of the water vapor into the processing vessel.

59. (New): The substrate processing apparatus according to claim 58, wherein the gas flow controller and the vapor flow controller are controlled by the control unit.

60. (New): The substrate processing apparatus according to claim 58, further comprising a discharge flow controller for controlling a discharge rate from the processing vessel to maintain a pressurized atmosphere in the processing vessel.

61. (New): The substrate processing apparatus according to claim 57, further comprising a mist trap connected to the processing vessel, the mist trap including:

a cooling unit for cooling the discharged ozone gas and water vapor from the processing vessel to condense the discharged water vapor into a liquid water; and

a discharge unit for receiving and discharging the ozone gas and the liquid water.

62. (New) The substrate processing apparatus according to claim 61, wherein an ozone killer for killing the discharged ozone gas is connected to the discharge unit, and a drain for the liquid water is provided on a bottom of the discharge unit.

63. (New): The substrate processing apparatus according to claim 57, further comprising a purge gas supply section for supplying a purge gas into the processing vessel to purge the processing vessel of the remaining ozone gas and water vapor.

64. (New): The substrate processing apparatus according to claim 57, further comprising a hot gas supply section for supplying a hot gas into the processing vessel to heat an atmosphere in the processing vessel.